The Allocation of Talent, Economic Development and Skill Premia

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Three central observations motivate this paper. First, there is little variation in the fraction of unskilled workers between rich and middle income countries. This occurs despite well-known, large differences in output per worker. Among a set of rich countries, unskilled workers 25 and older, defined as those with at most high school education, averaged 82 percent. Meanwhile, for a set of middle income countries, the average fraction is about 87 percent. Second, skill premia, defined as the the ratio of earnings per skilled worker to the earnings per unskilled worker, varies much more across the same set of countries. The skill premium in the poorer countries is about 62.5 percent higher than that in the rich group: it averaged 1.5 across rich countries whereas it averaged 2.4 for the middle income group.¹ Finally, data from the Programme for International Student Assessment (PISA) indicates substantial variation in the measured talent of young individuals across countries.

We develop a parsimonious framework that connects these observations. We model the division of the labor force between unskilled and skilled workers, and map this division into observables such as output and skill premia, as well as unobservables such as ‘quality’ of workers across countries. We discipline this framework with a host of aggregate and cross sectional observations, and then use it to investigate the extent to which the first two observations mentioned above can be accounted for by exogenous differences across countries. We also use the model to infer relative differences in Total Factor Productivity across countries, and compare these with standard measures from the one-sector growth model.

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¹Countries considered in the rich group are Australia, Belgium, Canada, Denmark, Finland, France, Germany, Israel, Italy, Netherlands, Norway, Spain, Sweden, United Kingdom and United States. Countries in the middle-income group are Argentina, Bolivia, Brazil, Chile, Czech Republic, Ecuador, Hungary, Mexico, Panama, Peru, Poland, Slovakia, Uruguay and Venezuela.
In our model, individuals are heterogeneous in their (exogenous) innate talents. All individuals are born as unskilled workers. They can become skilled workers by foregoing time and goods. To become a higher quality skilled worker, the individual has to invest more goods. A skilled worker has access to the wage rate for skilled labor, and to the earnings that are proportional to his talent and quality of skills. There is a single good in the economy, which is produced using skilled labor, unskilled labor and capital services. The two types of labor are imperfect substitutes, and potentially substitutes or complements to capital. Given factor prices, there is a unique division of individuals into skilled and unskilled workers: those with relatively high innate talent become part of the skilled labor pool, whereas the rest form the pool of unskilled workers.

We proxy the distribution of talent in each country by the country’s PISA scores. These tests are administered to 15-year old students enrolled in school. The distribution of PISA scores reveals substantial differences across countries. For instance, the mean reading score in the U.S. is 495 while that in Argentina is 374; the bottom 5th percentile reading score in the U.S. is 319 while that in Argentina is 155.

With the talent distribution in our model proxied by the distribution of PISA scores for richer countries, we use facts on earnings inequality, skill premium and the division of the labor force by skill to discipline the choice of model parameters. Specifically, we set parameter values to reproduce, in steady state, the fraction of skilled workers, skill premium and expenditures per-pupil as a fraction of output per worker. In our model, the differences in TFP and observed PISA scores imply that the fraction unskilled in poor countries would be 2.7 percent more than that in rich countries and the skill premium would be 10 percent more. The corresponding figures in the data are 9.3 percent and 64 percent. If we add country-specific impediments to the conversion of unskilled labor into skilled labor, and calibrate them to match the observed fraction of unskilled workers in each country, then our model generates 53 percent more skill premium in poor countries relative to rich.